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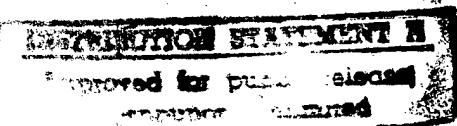
Resources, Community, and
Economic Development Division

B-275265

April 30, 1997

The Honorable Strom Thurmond
Chairman
The Honorable Carl Levin
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Floyd D. Spence
Chairman
The Honorable Ronald V. Dellums
Ranking Minority Member
Committee on National Security
House of Representatives



The Department of Defense (DOD) and certain other federal agencies are required to set aside a certain percentage of their research and development (R&D) budgets for the Small Business Innovation Research (SBIR) Program. In fiscal year 1997, this will amount to about \$1 billion governmentwide, of which about \$500 million is expected to be funded by DOD.

The National Defense Authorization Act for Fiscal Year 1997 required GAO to review certain aspects of DOD's SBIR program and report the results to the Congress.¹ To meet these objectives and by agreement with your offices, we reviewed DOD's policies and procedures to determine if they establish processes that help ensure that (1) quality research is performed under the funding agreements, (2) competitive procedures are being followed, and (3) technologies developed through the program are likely to be used in military programs or projects.

Results in Brief

DOD has implemented policies and procedures and has established an organizational structure to manage its SBIR program. On the basis of these factors and the results of DOD's research under the program to date, we believe that processes are in place to help ensure that quality research is being conducted, that competitive procedures are being followed, and that the resulting products and processes are being used in military projects and programs.

¹P.L. 104-201, Sept. 23, 1996.

Background

The Small Business Innovation Development Act of 1982 was intended to (1) stimulate technological innovation, (2) use small businesses to meet federal R&D needs, (3) foster participation by minority and disadvantaged persons in technological innovation, and (4) increase private sector commercialization of innovations derived from federal R&D.² The act required that agencies with "extramural" (external) R&D budgets of \$100 million or more set aside a certain percentage of those budgets for the SBIR program. Specifically, the act required that these agencies set aside not less than 0.2 percent of their extramural R&D budgets and provided for annual increases up to a ceiling of not less than 1.25 percent of their budgets. The act provided for a three-phased program: Phase I to determine the scientific and technical merit and feasibility of a proposed research idea; phase II to further develop the idea, taking into consideration such things as the commercialization potential; and phase III to commercialize the resulting product or process with no further SBIR funding.

The act gave the Small Business Administration (SBA) responsibility for (1) issuing guidance to the participating agencies on managing their SBIR programs, (2) surveying and monitoring the agencies' programs, and (3) reporting at least annually to pertinent committees of the Congress on the status of the programs and the results of the monitoring. SBA's policy directive to the participating agencies recommended that each phase-I and phase-II proposal be funded at \$50,000 or less and \$500,000 or less, respectively.

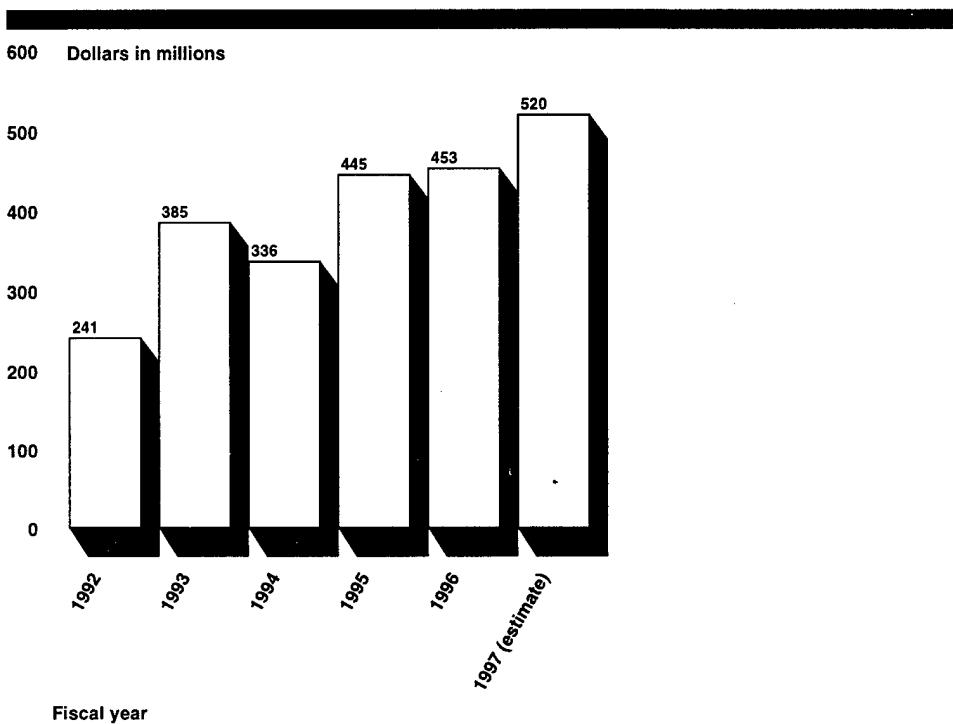
The Small Business Research and Development Enhancement Act of 1992 reauthorized the SBIR program through fiscal year 2000.³ The act emphasized the program's goal of increasing private sector commercialization. The act provided for further incremental increases in SBIR funding up to not less than 2.5 percent of agencies' extramural R&D budgets by fiscal year 1997. In addition, the act directed SBA to modify its policy directive to increase funding for phase-I and phase-II proposals to \$100,000 and \$750,000, respectively, with adjustments once every 5 years for inflation and changes in the program.

Funding for DOD's SBIR program since fiscal year 1992 is shown in figure 1.

²P.L. 97-219, July 22, 1982.

³P.L. 102-564, Oct. 28, 1992.

Figure 1: DOD's SBIR Expenditures, Current-Year Dollars (i.e., Not Adjusted for Inflation)



Note: Percentage of extramural R&D budget—1992 (1.25), 1993-94 (1.5), 1995-96 (2.0), and 1997 (2.5).

Ensuring Quality Research

Following SBA's guidance, DOD manages its program through its SBIR Program Manager in the Office of the Director, Small and Disadvantaged Business Utilization, which reports to the Under Secretary of Defense for Acquisition and Technology. There are eight participating military departments and defense agencies, referred to as "components." The components include the Air Force; Army; Ballistic Missile Defense Organization; Defense Advanced Research Projects Agency; Office of the Director, Defense Research and Engineering; Defense Special Weapons Agency; Navy; and Special Operations Command. The components use the following criteria approved by the Under Secretary to develop their own prospective SBIR R&D solicitation topics. The topics are to

- solicit R&D, not procurement; fall within one of DOD's key technology areas; allow the performing company significant flexibility in formulating its approach to meeting the R&D requirement; include examples of possible

phase III "dual-use" applications;⁴ and not duplicate each other by soliciting identical or very similar sets of proposals.

The components use their own procedures for evaluating and ranking their topics and then submit them to the DOD SBIR Program Manager.

DOD has a formal process for reviewing the topics, resolving any areas of concern, and incorporating the approved topics into a DOD-wide solicitation for proposals from small businesses (see app. I). This process is done twice each year. The proposals are received and reviewed by the cognizant DOD components. Each component uses the following criteria by DOD for selecting research proposals. The reviewers are to consider the

- soundness and technical merit of the proposed approach; potential for commercial (government or private sector) application and the expected benefits from commercialization; adequacy of the proposed effort for fulfilling requirements of the research topic; and qualifications of the proposed principal/key researchers, supporting staff, and consultants. Qualifications include the ability to perform the R&D and to commercialize the results.

However, each component uses its own procedures for evaluating and ranking the proposals and for determining which proposals will be funded. The components provide oversight of the ongoing R&D.

Measuring the value or quality of any R&D effort has always proven to be difficult. In a previous report, we used certain statistics to try to measure whether the quality of SBIR proposals governmentwide had kept pace with the program's expansion.⁵ We looked at trends in the level of competition (the number of proposals submitted vs. the number funded) and the quality of competition (the number of proposals funded vs. the number deemed worthy of funding but not funded). These statistics indicated that (1) the level and quality of competition had kept pace with the increases in funding and (2) the level of research quality was being maintained. In reporting to the Congress on the quality of its SBIR research, DOD used the same statistics.⁶

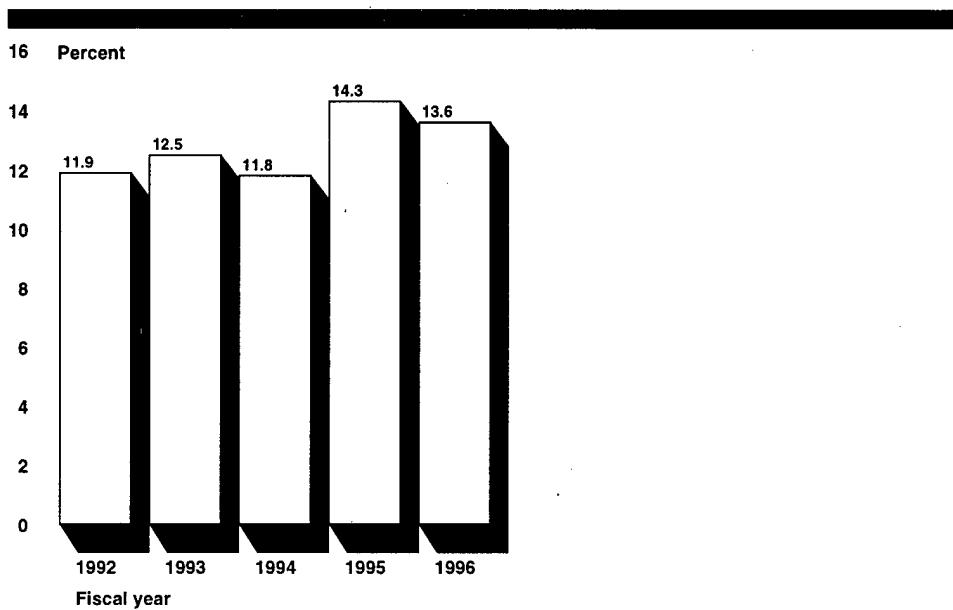
⁴Dual use means that the research product or process can be used in military projects or programs and can be used commercially.

⁵Federal Research: Interim Report on the Small Business Innovation Research Program (GAO/RCED-95-59, Mar. 8, 1995).

⁶Quality of Research Under the DOD Small Business Innovation Research (SBIR) Program, Office of the Under Secretary of Defense (Acquisition & Technology), May 30, 1996.

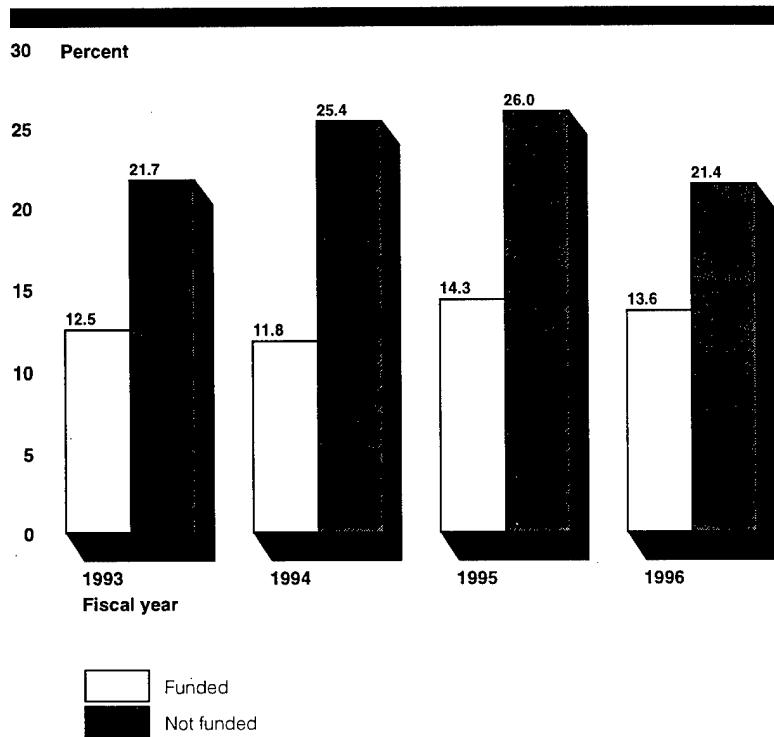
For this review, we updated these statistics through fiscal year 1996. The percentage of phase-I proposals that were funded (fig. 2) and the ratio of phase-I proposals that were funded to the worthy proposals not funded (fig. 3) have remained fairly constant.

Figure 2: Percentage of Phase-I Proposals Funded



Note: Percentage of extramural R&D budget—1992 (1.25), 1993-94 (1.5), and 1995-96 (2.0).

Figure 3: Phase-I Proposals Deemed Worthy of Funding—Funded Vs. Not Funded



As additional potential measures of research quality, we also obtained available statistics on the percentage of phase-I proposals that went on to phase II (see app. II) and on the extent of commercialization of the results of the research. On the basis of the preliminary results of a survey by DOD, we determined that

- about one-half of the respondents have had sales of a product, process, or service; average sales amount per project has been about \$756,000; and about 52 percent of the total sales have been made to DOD or its prime contractors, about 35 percent to the private sector, and the remaining percent to other customers.

These data suggest that quality projects are being funded, that there is adequate competition for the projects, and that the research results are being used in military projects and programs.

Ensuring Full, Open Competition

DOD has implemented procedures to help ensure that competition for research funding under the SBIR program is fair. The solicitations for research proposals are published widely through trade publications, regularly established information outlets for DOD's contracting, and the Internet. The solicitations are generally open to any individual or organization that qualifies as a small business. The solicitations specify the requirements that small businesses must meet to be eligible to apply. Furthermore, in their proposals, the small businesses must certify under penalty of law that they meet all of the requirements. The DOD Inspector General conducts investigations, as warranted, to ensure compliance with these requirements.

To promote more competition for its research projects, DOD conducts three national SBIR conferences each year and participates in many state-organized conferences. These conferences are used to provide small businesses with information on R&D opportunities available to them and on how to submit research proposals or how to obtain technical assistance in developing proposals. Technical assistance is available from the Defense Technology Information Center through the mail, walk-in offices, and the Internet. DOD also has a prerelease program, whereby small businesses learn about upcoming research solicitations in advance so that they can contact the appropriate DOD component to get specific information. According to DOD, this results in higher-quality proposals. To better gauge the extent of competition, DOD's solicitations now require small businesses to provide information on their prior SBIR proposals that have been funded.

The DOD components have their own programs to encourage more competition. The components issue brochures and advertisements in trade journals, informing small businesses how to get detailed information on R&D opportunities and how to apply for them.

Ensuring Military Applicability

Several factors help ensure that the research efforts under the SBIR program have military applicability. The research topics are developed by the components' technical organizations to support their missions, all of which are military-related. DOD's guidance requires that the research topics address one of the Department's key technology areas and that they have dual-use application.⁷ There is required linkage between the topics and military planning documents. Furthermore, the preliminary results of DOD's recent survey on commercialization show that about one-half of the sales

⁷For example, a primary success story of DOD's SBIR program is the "SaviTag" system of tracking shipping containers. Combined military and commercial sales of this system were anticipated to be \$30 million in 1996.

from the program's research efforts have been made to DOD or its prime contractors for use in military programs.

Agency Comments

We provided copies of a draft of this report to DOD for review and comment. We discussed the draft with DOD officials, including the SBIR Program Manager, who said that the Department concurs with the facts in the report. The manager also provided information to update certain statistics. That information has been incorporated into the final report.

Scope and Methodology

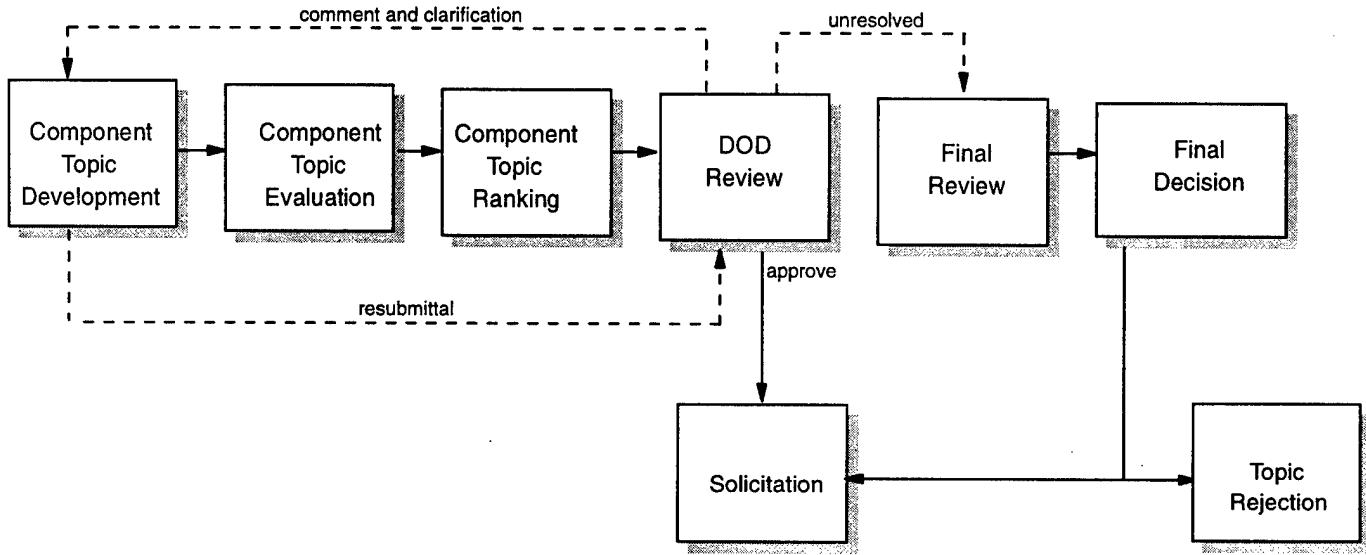
We interviewed officials in SBA, DOD, and the participating DOD components. We obtained and reviewed implementing instructions, guidelines, and other pertinent documents. However, we did not evaluate the effectiveness or implementation of DOD's policies or procedures. Our verification was limited to reviewing statistics on the number of research proposals funded; the ratio of funded proposals to worthy but unfunded proposals; the number of phase-I proposals that go on to phase II; and the extent of commercialization of the research results. Our planned work—mandated by the Small Business Research and Development Enhancement Act of 1992—will examine in greater detail the management and implementation of the SBIR programs of all participating federal agencies, including DOD. We performed our review from January through March 1997 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretary of Defense and the SBA Administrator. We will make copies available to others on request. If you have any questions or need additional information, please call me at (202) 512-3841. Major contributors to this report are listed in appendix III.



Victor S. Rezendes
Director, Energy, Resources,
and Science Issues

The Department of Defense's Topic Identification and Approval Process



Note: The Department of Defense's (DOD) review is performed by the Office of the Director, Defense Research and Engineering, which interacts with the components to resolve any concerns. If the concerns cannot be resolved, the topic is submitted to the Integrated Review Committee for final review (this is a 1-year pilot program). The Committee makes its recommendation to the Director, Office of Small and Disadvantaged Business Utilization. The Director makes the final decision in consultation with the Director, Defense Research and Engineering. The review process (from DOD's review to topic approval) takes about 6 weeks.

Phase-I Proposals That Went on to Phase II, Fiscal Years 1983 Through 1996

	Phase-I proposals funded	Phase-II proposals funded	Percent of phase-I proposals that went on to phase II
Army	2,681	1,041	38.8
Air Force	3,865	1,448	37.5
Director, Defense Research and Engineering	59	22	37.3
Navy	3,190	1,005	31.5
Defense Special Weapons Agency	248	70	28.2
Defense Advanced Research Projects Agency	1,360	382	28.1
Ballistic Missile Defense Organization	1,555	418	26.9
Special Operations Command	30	7	23.3
Totals	12,988	4,393	33.8

Note: The Special Operations Command and the Director, Defense Research and Engineering, have been participating in the program since fiscal years 1993 and 1995, respectively.

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